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as the Pinna, and which are composed of a multitude of flattened hexagonal calcareous prisms, originally deposited in continuous layers of hexagonal cells, and thus constituting a calcified epithelium, analogous with the enamel of the teeth. Secondly, those consisting of membranous shell-substance, the basis of which, after the removal of its calcareous portion, presents nothing but a membranous film, of greater or less consistence, composed of several layers, but without the appearance of any cellular tissue: this membrane the author regards as being derived from the mantle, of which it was originally a constituent part, by the development of nucleolated cells; and the various corrugations and foldings of which it is susceptible in different species, introducing many diversities into the structure of the shells of this class. Thirdly, shells having a nacreous structure, and exhibiting the phenomena of iridescence; a property which the author ascribes to the plicated form of the membrane of the shell, combined with a secondary series of transverse corrugations. Fourthly, shells exhibiting a tubular structure, formed by cylindrical perforations occurring among the several layers, and varying in diameter from about the 20,000th to the 3500th part of an inch; but measuring on an average about the 6000th part of an inch, and presenting a striking analogy with the dentine or ivory of the teeth. The last sections of the paper relate to the epidermis and the colouring matter of shells.

References are made, in many parts of the paper, to illustrative drawings; which, however, the author has not yet supplied.

January 26, 1843.

Sir JOHN WILLIAM LUBBOCK, Bart., V.P. and Treasurer,
in the Chair.

The following papers were read, viz.:—

1. "Observations on certain cases of Elliptic Polarization of Light by Reflection," by the Rev. Baden Powell, M.A., F.R.S., Savilian Professor of Geometry in the University of Oxford.

The author, by way of introduction, passes in review the labours of various inquirers on the subject of the elliptic polarization of light, and notices more particularly those of Sir David Brewster, who first discovered this curious property, as recorded in the *Philosophical Transactions* for 1830; of Mr. Airy, in the *Cambridge Transactions* for 1831 and 1832; and of Professor Lloyd, in the *Philosophical Transactions* for 1840, and in the *Reports of the British Association* for 1841. He then proceeds to give an account of his own experimental examination of the phenomena of elliptic polarization in the reflection of light from various surfaces, by observing the modifications of the polarized rings under different conditions, both of surface and of incidence, and by endeavouring to ascertain both the existence and amount of ellipticity, as shown by

the dislocation of those rings, and to determine its peculiar character, as indicated by the direction in which the dislocation takes place; the protrusion of the alternate quadrants appearing, in certain cases, in one direction, and in others in the opposite. These observations are reducible to two classes; first, those designed to contribute to the inquiry, what substances possess the property of elliptic polarization, by examining the light reflected from various bodies; and second, those made on certain cases of films of several kinds, including those formed on metals by oxidation or other action upon the metal itself, as well as by extraneous deposition. The author found the general result, in all these cases, to be, that from any one tint to another, through each entire order of tints, the form of the rings in the reflected light undergoes certain regular changes; passing from a dislocation in one direction to that in the opposite, through an intermediate point of no dislocation, or of plane polarization; and thus exhibiting a dark and a bright centred system alternately, as long as the order of tints are preserved pure. These changes in the form of the rings, he observes, are precisely those expressed by successive modifications of Mr. Airy's formula, corresponding to the increments in the retardation which belong to the periodical colours of the films.

The remaining portion of the paper is occupied by a description of the apparatus and mode of conducting the experiments; and of the observations made on mica, on decomposed glass, plumbago, daguerreotype, and other metallic plates, and on the coloured films produced on steel and on copper by the action of heat, and of voltaic electricity. The author gives, in conclusion, an analytical investigation of Mr. Airy's general formula.

2. "Variation of the Magnetic Needle as observed at Washington City, D. C., from 3^h 30^m July 24th to 3^h July 25th, 1840, inclusive (Göttingen mean time)," by Lieut. Gillies, of the United States Service. Communicated by Samuel Hunter Christie, Esq., Sec. R.S.

February 2, 1843.

Sir JOHN WILLIAM LUBBOCK, Bart., V.P. and Treasurer, in the Chair, succeeded by the MARQUIS OF NORTHAMPTON, the President, in the Chair.

John Benjamin Heath, Esq., James MacCullagh, Esq., and George Owen Rees, M.D., were balloted for and duly elected Fellows of the Society.

A paper was read, entitled "Experimental Researches in Electricity:" Eighteenth Series; by Michael Faraday, Esq., D.C.L., F.R.S. Section 25. On the Electricity evolved by the Friction of Water and Steam against other bodies.